CLAIMS

What is claimed is:

1. A method of designing a set of wavelet basis, the method comprising:

constructing a neural network of arbitrary complexity using a discrete and finite Radon transform;

designing an input wavelet to fit a particular problem;

feeding an input wavelet prototype designed to fit a particular problem through the neural network and its backpropagation to produce an output; and

modifying an input function of the neural network using the output.

2. The method of claim 1 wherein constructing the neural network comprises backprojecting the Radon transform to a point; and

subtracting a global average function of the point.

3. The method of claim 2 wherein the global average function is dependent on the transform geometry and may be varied by varying the interconnect structure of the neural network.

4. The method of claim 1 wherein the transform is dual to the network.

5. The method of claim 4 wherein the transform is weighted to a desired template function.

6. The method of claim 1 wherein modifying the input function comprises subtracting a difference between the input and the output from the input wavelet prototype and moving the input function in the opposite direction from the difference so that the difference converges to zero.

7. The method of claim 1 wherein a central equation for the Radon transform is selected from the group consisting of a Gindikin equation or a Bolker equation.

8. The method of claim 1 wherein the wavelet bases are used to compress data selected from the group consisting of images, multidimensional data, or spatiotemporal data.

9. The method of claim 5 wherein the template function is a sphere.

10. A system for designing a set of wavelet basis, the system comprising:
means for constructing a neural network of arbitrary complexity using a discrete and finite Radon transform;
means for designing an input wavelet to fit a particular problem;
means for feeding an input wavelet prototype designed to fit a particular problem though the neural network and its backpropagation to produce an output; and
means for modifying an input function of the neural net using the output.

11. A computer readable medium comprising instructions, which when executed on a processor, perform a method of designing a set of wavelet basis, the method comprising:
constructing a neural network of arbitrary complexity using a discrete and finite Radon transform;
designing an input wavelet to fit a particular problem
feeding an input wavelet prototype designed to fit a particular problem through the neural network and its backpropagation to produce an output; and
modifying an input function of the neural net using the output.

12. An apparatus for designing a set of wavelet basis, the apparatus comprising:

a neural network constructor that uses a discrete and finite Radon transform to construct a neural network of arbitrary complexity;

a designing module to design an input wavelet to fit a particular problem, the designing module coupled to the neural network constructor;

a feeder to feed an input wavelet prototype designed to fit a particular problem through the neural network and its backpropagation to produce an output, the feeder coupled to the designing module; and

a modifier module to modify an input function of the neural net using the output, the modifier module coupled to the feeder.

13. The apparatus of claim 12 wherein the neural net constructor is configured to backproject the Radon transform to a point and to subtract a global average function of the point.

14. The apparatus of claim 13 wherein the global average function is dependent on the transform geometry and may be varied by varying the interconnect structure of the neural network.

15. The apparatus of claim 12 wherein the transform is dual to the network.

16. The apparatus of claim 15 wherein the transform is weighted to a desired template function.

17. The apparatus of claim 12 wherein the modifier module is configured to subtract the difference between the input and the output from the input wavelet prototype and move the input function in the opposite direction from the difference such that the difference converges to zero.

18. The apparatus of claim 12 wherein a central equation for the Radon transform is selected from the group consisting of a Gindikin equation or a Bolker equation.

19. The apparatus of claim 12 wherein the wavelet bases are used to compress data selected from the group consisting of images, multidimensional data, or spatiotemporal data.

20. The apparatus of claim 16 wherein the template function is a sphere.